

to Science

In an editorial in the August 11 issue, "Will Society Be Prepared", Dr. Marshall W. Nirenberg wrote about the prospects of molecular genetics:

"Cells will be programmed with synthetic messages within 25 years, and when man becomes capable of programming his own cells, he must refrain from doing so until he has sufficient wisdom to use this knowledge for the benefit of mankind."

No subject of policy is more important than this, and it deserves the most critical debate. There is some danger that, whether so intended or not, Nirenberg's language could generate public misunderstandings that might undercut the very research needed to reach sufficient wisdom.

His underlying concern, which I share, is for the use of biological control by a malevolent government to the peril of individual freedom. As Hitler's race policy illustrated only too well, the States' access to forcible compulsion already gives it the power of genocide.

Presumably we have to be even more concerned about subtler mistakes. A well-intentioned government might impose rash commitments for the sake of short-run advantages. Plainly we must be very sensitive about innovations that, once introduced, constituted irreversible evolutionary deviations.

However, in reading Nirenberg's editorial, we should emphasize the distinction between evolutionary deviation and eugenics, i.e., the reprogramming of somatic cells and the modification of development. "Message" does carry a strong connotation of RNA messengers with somatic effects. To interdict such personal uses of messages would be hard to justify without a prohibition on all new medicine, especially such interventions as the use of hormones. If only germinal messages are meant, we

have other prospects to worry about too. The manipulation of germ cells for genetic surgery would almost certainly be preceded by techniques for clonal propagation and for chromosome manipulations in human beings, which would already have the most cogent evolutionary implications.

Human culture - as Mugller has pointed out - is already a major commitment of individual development to formative influences decided by the community. Our educational systems are certainly a form of psychological engineering scarcely different in fundamental principle from the biological interventions that our knowledge of nucleic acids is likely to bring about.

In point of fact, we already practice biological engineering on a rather large scale by use of live viruses in mass immunization campaigns. While these are of indubitable value for preventing serious diseases, their global impact on the development of human beings of a wide range of genotypes is hard to assess at our present stage of wisdom. Crude virus preparations such as are in common use at the present time are also vulnerable to frightful mishaps of contamination and misidentification. ⁴ Live viruses are themselves genetic messages used for the purpose of programming human cells for the synthesis of immunizing virus antigens. Dr. Nirenberg's cautions are just as relevant to considerations of contemporary policy as they are for the ever-widening applications of molecular biology in the near future.

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Our main concern must be to maximize the role of individual decision.

This could be defeated by overenthusiastic policing against personal initiative and experimentation as well as by premature positive measures imposed by the State.